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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/814,697

03/30/2004

Xiaolei Shi

140264

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6147 7590 03/24/2008  
GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
PATENT DOCKET RM. BLDG. K1-4A59  
NISKAYUNA, NY 12309

EXAMINER

VERDERAME, ANNA L

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

03/24/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/814,697	<b>Applicant(s)</b> SHI ET AL.	
	<b>Examiner</b> ANNA L. VERDERAME	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 February 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 13-16 and 18-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-16 and 18-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/29/2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 13-16 and 18-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has amended claim 13 to include the limitation that " the nonlinear optical material is configured for providing an effective aperture within the mask layer upon a gate beam having a power ranging up to about 10 milliwatts being directed at the optical disk". The applicant points to paragraphs 26 and 33 as providing support for this amendment. In both paragraphs 0026 and 0033 the gate beam is discussed in terms of the mask layer which is composed of both a non-linear optical material and embedded nanoparticles. The language "the nonlinear optical material ...upon a gate beam having a power ranging up to about 10 milliwatts being directed at the optical disk" seems to imply the application of a gate beam having a power of up to about 10 milliwatts onto just the non-linear optical material. This is not disclosed anywhere in the applicant's specification. Further, the specification recites that the "nonlinear optical material is configured for providing an effective aperture" within the mask layer. Again, it is not the non-linear

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optical material itself but is rather the mask layer composed of a non-linear optical material having nanoparticles embedded therein that “is configured for providing an aperture”. Further still, in regard to the power of the gate beam, the applicant discloses that the gate and signal beams will operate in a wavelength range from about 400 nanometers to about 800 nanometers and a power range of from about five milliwatts to about 10 milliwatts at (0033). Further, the applicant discloses that specific wavelength and power settings will depend on the nanoparticle and mask material at (0036). The amendment recites a gate beam having a power ranging up to about 10 milliwatts. This embraces a range from zero to about 10 milliwatts and is not fully supported by the specification.

In summary, the claims are to a mask layer comprising both a nonlinear optical material and embedded nanoparticles. The properties of the non-linear optical material itself are irrelevant to the properties of the mask layer material having nanoparticles embedded in a non-linear optical material.

### **Claim Rejections - 35 USC § 102**

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Hwang et al. 2004/0161575 as evidenced by Arnone et al. WO/00/75641(6,828,558 used as a translation).

Hwang et al. claims a high-density optical disk comprising a substrate with pits (data layer and supporting substrate) and at least one mask layer with a super resolution near-field structure wherein at least one mask layer comprises a mixture of a dielectric material and metal particles. Claim two recites the suitable dielectric materials as being metal oxide, nitride, sulfide, fluoride, or mixture thereof. Applicant discloses that the metal particles may be gold particles. Figure 3 shows that the invention of this application results in improves C/N (dB) ratio when recording smaller marks as compared to the prior art. The mask layer, containing metal particles dispersed in a dielectric material, acts as an aperture for near field light due to self-focusing effect. Therefore fine marks with a size of, for example, 100 nm or less can be read using a laser with a wavelength of, for example 680 nm. Metal particles have a size smaller than a wavelength of a laser beam (0029). Dielectric materials used in the masking layer 11 include any of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, SiN, ZnS, and MgF<sub>2</sub> (0030). Metal particles to be dispersed in the masking layer include gold, platinum, rhodium, and palladium (0030). The application also discusses the prior use of silver oxide super resolution films (0013). This is also discussed in the applicants Background section at (0007). An optical recording medium having a large capacity can be obtained without decreasing the wavelength of the laser diode (0014).

Since the claims are to the combination of a mask layer with a data layer, and not to a photosensitive data layer, the art anticipates the claims.

Hwang et al. does not explicitly state that the dielectric materials used in the masking layer are non-linear optical materials.

Claim 10, of Arnone et al. WO 00/75641(6,828,558 used as a translation), recites a material with non-linear optical properties chosen from a group including ZnS. The teachings of this reference are used solely to establish that the dielectric materials recited by Hwang et al. inherently exhibit non-linear optical properties.

The applicant's disclosure regarding acceptable materials for use as the non-linear optical material of the masking layer is extremely vague. Disclosure of specific materials would help to make the specification clearer and would have helped in the examination of this application. However, addition of such specific materials would be considered new matter.

3. Claim 13 is rejected under 35 U.S.C. 102(b) as being anticipated by Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876- 1879(March/2002) as evidenced by Yamamoto et al. 2003/0152739.

A polycarbonate disk with pits having a depth of 50 nm and lengths of 0.2-0.4 microns is provided with a reflective layer, followed by either Gr-1 (Ag particles are 5 nm in silicon dioxide) or Gr-2, where the Ag particles are 10 nm in silicon dioxide) over

coated with a dielectric to prevent GR layer from mixing with the UV-curable resin layer (section 2.3 and section 2.1). Fig 1. shows that the change in refractive index of the film is dependent upon the size of the metal particles and the density of the metal particles in the film(section 2.1).

Since the claims are to the combination of a mask layer with a data layer(pits in this reference), and not to a photosensitive data layer, the art anticipates the claims. Nomura et al. does not explicitly state that SiO<sub>2</sub> is a non-linear optical material. Claim 5 of Yamamoto et al. teaches a non-linear optical film containing SiO<sub>2</sub>. The teachings of this reference are used solely to establish that SiO<sub>2</sub> recited by Nomura et al. inherently exhibits non-linear optical properties. Further, applicant has the burden, if in disagreement, to show that a SiO<sub>2</sub> does not exhibit non-linear optical properties.

4. Claims 13-15, 20, and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Nomura et al. JP2002-133720 as evidenced by Yamamoto et al. 200310152739.

Nomura et al. teaches an optical recording medium as shown in figure one where on the light-transmitting polycarbonate substrate 2 there is formed, a first dielectric film 4 of ZnS-SiO<sub>2</sub> having a thickness of 75 nm, a AgInSbTe phase change recording layer having a thickness of 20 nm, a second dielectric film 8 of ZnS-SiO<sub>2</sub> having a thickness of 10 nm, a mask layer comprising a dielectric material (SiO<sub>2</sub>) 10A and metal particles

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(Ag) 10B, a reflective layer 10, and a protective layer 12(0012-0013). Nomura et al teaches a near field super resolution layer in a phase change optical recording medium. This layer is a dielectric layer, including SiO<sub>2</sub>, ZnS-SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, and SiN with metal particles, such as Au, Ag, or Al dispersed therein (0007). In super-resolution films of the prior art it was difficult to control the size of the metal particle. This problem is solved by the present invention(0005). This invention allows for recognizing the minute record mark below a diffraction limitation and reproducing information (0006). Nomura et al. does not explicitly state that SiO<sub>2</sub> ZnS-SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, and SiN are non-linear optical materials.

Claim 5 of Yamamoto et al. teaches a non-linear optical film containing SiO<sub>2</sub>. The teachings of this reference are used solely to establish that SiO<sub>2</sub> recited by Nomura et al. inherently exhibits non-linear optical properties. Further, applicant has the burden, if in disagreement, to show that a SiO<sub>2</sub> does not exhibit non-linear optical properties.

5. Claims 13,19-20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Iida EP 0 580 346.

Iida teaches a high density optical disk 2, shown in figure 3, consisting of a substrate 13, a shutter layer 17 formed on the substrate, and a recording film 18 formed on the shutter layer. Recording pits are formed on the recording layer by shining light through the substrate and the shutter layer and onto the recording layer. The shutter



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layer 17 tightens the irradiated beam for information reproduction or recording allowing for a high-density medium. The shutter layer comprises semiconductor fine particles in a glass or resin matrix. The particle size of the semiconductor fine particles is from 0.1 to 50 nm and preferably from 0.5 to 30 nm(nanoparticles). Therefore the semiconductor fine particles are nanoparticles. Resins such as polymethyl methacrylates, polycarbonates, polystyrenes, amorphous polyolefins, and epoxy resins can be used(claim 22). The particle density affects the properties of the shutter layer and should be at least 1 mol% and should not exceed 80 mol %(3/11-41). The recording layer may be a thin film of an organic dyes such as cyanine or phthalocyanine(claim 19). Function of the shutter layer is disclosed at (4/14-26). The wavelength of the light beam for information reading or writing in the optical disk 310 to 890 nm and the composition of the shutter layer is chosen in accordance with the wavelength actually employed.

The bolded portion shows that the shutter layer comprises metal particles embedded in a glass or resin matrix. Resins include polymethyl methacrylates, polycarbonates, polystyrenes, amorphous polyolefins, and epoxy resins. The applicant broadly recites the use of organic materials as the non-linear optical material of the masking layer.

Applicant has the burden, if in disagreement, to show that the organic resins recited by lida do not exhibit non-linear optical properties. The applicant's disclosure regarding acceptable materials for use as the non-linear optical material of the masking layer is extremely vague. Disclosure of specific materials would help to make the specification clearer and would have helped in the examination of this application. However, addition

of such specific materials would be considered new matter.

### **Claim Rejections - 35 USC § 103**

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 13,16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. 20021015496 in view of any of Hwang et al. 2004/0161575, Nomura et al. 2002-133720, or Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002).

Hsu et al. teaches a super-resolution recordable optical disk, as shown in Figs. 6A and B, formed on a substrate 1 made from polycarbonate substrate. On the substrate 1, a reflective layer 3 made of Au, Ag, Al, Cu or their alloys is formed to a thickness of between 70-160 nm. An organic dye layer 22 is formed by spin coating on the metal reflective layer. An interface layer 53 is formed from SiNx, SiO<sub>2</sub>, or ZnS-SiO<sub>2</sub> is formed on the dye-recording layer. Then a mask layer 52 made from Antimony, silver oxide, or thermochromic organic compounds was formed on the interference layer.

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Finally, a dielectric layer 51 and a thin polycarbonate layer 42 is formed on the surface of the mask layer (0026-0027).

Hsu et al. does not teach a mask layer comprising nanoparticles embedded in a non-linear optical material.

Hwang et al. 2004/0161575, Nomura et al. 2002-133720, and Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002) all teach a mask layer containing nanoparticles embedded in a non-linear optical material. Silver oxide is a non-linear optical material.

It would have been obvious to one of ordinary skill in the art to modify the super-resolution recordable optical disk taught by Hsu et al. by using the mask layers taught by any of Hwang et al. 2004/0161575, Nomura et al. 2002-133720, or Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002), comprising metal nanoparticles embedded in a non-linear optical material with the reasonable expectation of forming an optical recording medium in which the size of the particles in the mask layer can be controlled [Nomura et al. 2002-133720 (0005)] and in which capable of high-density recording below the diffraction limit (Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture",

Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002) and Hwang et al. 2004/0161575).

8. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hsu et al. 2002/015496 in view of any of Hwang et al. 2004/0161575, Nomura et al. 2002-133720, or Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002) further in view of Fujii et al., "A near-field recording and readout technology using a metallic probe in an optical disk" Japanese Journal of Applied Physics Vol. 39 (2000) pp.980-981.

The combination of Hsu et al. 2002/015496 in view of any of Hwang et al. 2004/0161575, Nomura et al. 2002-133720, or Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002) does not teach an optical disk comprising a data layer, mask layer overlying the data layer and comprising a nonlinear optical material and nanoparticles embedded in the nonlinear optical material where in the data layer comprises Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub>.

Fujii et al. teaches an optical disk having the structure shown in figure one where the data layer is a Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub> phase-change layer and the mask layer is made of AgOx, a material conventionally used in the prior art.

It would have been obvious to one of ordinary skill in the art to modify the optical recording medium taught by The combination of Hsu et al. 2002/015496 in view of any of Hwang et al. 2004/0161575, Nomura et al. 2002-133720, or Nomura et al., "Super-resolution read only memory disk with metal nanoparticles or small aperture", Japanese Journal of Applied Physics. Pt 1. vol. 41(3B) pp. 1876-1879(March/2002) by using a Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub> phase-change layer as the data layer based on the use of a Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub> phase-change layer with the AgOx mask layer, a material conventionally used in the prior art, with the reasonable expectation of forming a useful optical recording medium.

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lida EP 0 580 346 in view of Kim et al WO/2004/029936.

Lida teaches a high-density optical recording medium comprising a "shutter layer" (mask layer) of a glass(including SiO<sub>2</sub>) or resin material having nano particles embedded therein. Non-linearity is taught at (4/25-26). However, lida does not teach the use of Sb as the non-linear material.

Kim et al. teaches an optical recording medium as shown in figure 1. When Sb is used as the non-linear optical material of the mask layer it becomes transparent(2/21-22). The mask layer can also be silicon dioxide (abstract). Kim et al. essentially teaches that both Sb and SiO<sub>2</sub> are non-linear optical materials.

It would have been obvious to modify the "shutter layer" (mask layer), comprising SiO<sub>2</sub> (a non-linear optical material) with nanoparticles embedded therein taught by Lida by substituting Sb for SiO<sub>2</sub> based on the use of Sb in the mask layer taught by Kim et al. and based on disclosure that both SiO<sub>2</sub> and Sb are non-linear optical materials by Kim et al, and with the reasonable expectation of forming a useful shutter layer comprising a non-linear optical material having nanoparticles embedded therein.

10. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. 2002-133720 as evidenced by Yamamoto et al. 2003/0152739 in view of Sonnichsen et al. "Drastic Reduction of Plasmon Damping in Gold Nanorods" Physical Review Letters. Volume 88, Number 7, 2002.

Nomura et al. does not teach the use of nanoparticles in a mask layer where in nanoparticles comprise rods or shells wherein the rods have widths of about 20 nm and lengths of about 50 nm.

Sonnichsen teaches the scattering of light by gold nanoparticles including gold nanorods having lengths up to 100 nm and diameters of 20-150 nm. Figure 3 shows that scattering by gold nanorods produces a spectrum having a narrower line width than the light scattering spectrum formed by gold nanospheres. Use of nanorods results in high light scattering efficiencies and large local field enhancement factors, making nanorods interesting for a range of optical applications.

In regard to claim 26 the teaching that the nanorods have lengths of less than 100 nm meets the limitations of these claims which recites a nanorod length of 20 to 50 nm.

It would have been obvious to one of ordinary skill in the art to modify the super resolution layer, comprising a dielectric material with metal particles dispersed therein, of the optical recording medium taught by Nomura et al. by using rod or sphere shaped nanoparticles with the reasonable expectation of forming a mask layer which exhibits high light scattering efficiency and large local field enhancement factors as taught by Sonnichsen et al.

11. Claims 25 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. 2002-133720 as evidenced by Yamamoto et al. 2003/0152739 in view of Sonnichsen et al. "Drastic Reduction of Plasmon Damping in Gold Nanorods" Physical Review Letters. Volume 88, Number 7, 2002 as applied above and further in view of Perry et al. WO 02/48432(US 2004/0079195).

Nomura et al. does not teach gold nanoparticles embedded in the mask layer. Further, Nomura et al. does not teach coated nanoparticles where the coating comprises oligonucleotides functionalized on the 5' or 3' end with alkylthiol.

Perry et al. teaches a film containing metal particles in a matrix. The matrix material may be polymer, glass, highly viscous liquid etc. The metal particles can be

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silver, gold, copper, or iridium nanoparticles with dimensions of from 1 to 200 nm (diameter) coated with organic ligands (WO pgs. 15-16). Nanoparticles are coated with organic ligands composed of essentially 3 parts A-B-C. A is a molecular or ionic fragment that has at least one atom having a lone pair of electrons that can bond to the metal nanoparticle surface. A can be an alkylthiol group. Part B is an organic fragment that has two points of attachment, one to A and one to C. B can be a single bond. Part C is a molecular fragment with one point of attachment to fragment B. C may be an oligonucleotide strand. The bond is either at the 5' or the 3' end of the oligonucleotide strand (WO pgs 16(bottom) to 17). Perry et al. also teaches that these coatings can stabilize the nanoparticles with respect to aggregation and or coalescence of the metal core of the particle (page 8, 2nd paragraph).

It would have been obvious to one of ordinary skill in the art to modify the super resolution layer, comprising a dielectric material with metal particles dispersed therein, of the optical recording medium taught by Nomura et al. by coating the particles with the coating, comprising an oligonucleotide having an alkylthiol group bound to either the 3' or the 5' end, taught by Perry et al. at (WO pgs 16(bottom) to 17) with the reasonable expectation of forming a film whose metal nanoparticles are stabilized with respect to aggregation and or coalescence of the metal core of the particle (page 8, 2nd paragraph). Further, it would have been obvious to use gold nanoparticles based on the disclosure of Perry et al.



In regard to claim 28 which claims that the nanoparticles embedded in the mask layer comprise vertically aligned nanoparticles, the applicant has the burden of distinguishing their invention from that disclosed in the prior art or establishing the criticality of vertically aligned nanoparticles. The figure on the front of Perry et al.(US2004/0079195) shows vertically aligned nanoparticles.

### **Response to Arguments**

12. The applicant's argument and presentation of prior art showing that ZnS only exhibits non-linear optical properties at higher powers than those used for example in Hwang et al. is irrelevant. The claims and the reference teach a mask layer composed of a non-linear optical material having nano-particles embedded therein. Powers used for the material itself and those used for the mask layer composed of the non-linear material having nano-particles therein will be different. Further, the applicant fails to address the examiner's applied art pertaining to the use of Sb and resinous material as the non-linear optical material of the mask layer comprised of both the non-linear optical material and nano-particles embedded therein

### **Conclusion**

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna L. Verderame whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. L. V./

Examiner, Art Unit 1795

**/Mark F. Huff/  
Supervisory Patent Examiner, Art Unit 1795**